

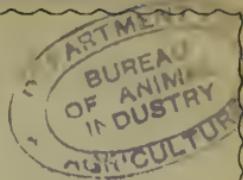
Historic, archived document

Do not assume content reflects current scientific knowledge, policies, or practices.

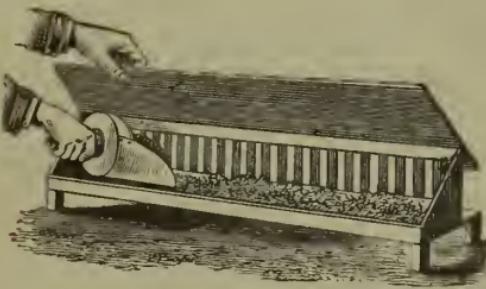
47
-6Hf

1007

Price, 25 Cents.



HOW TO FEED FOWLS;



TREATISE ON THE
PROPER FOODS AND WHYS OF USING THEM.

By H. H. STODDARD,

EDITOR OF "THE POULTRY WORLD," AND "AMERICAN POULTRY YARD."
AUTHOR OF "AN EGG FARM," "POULTRY ARCHITECTURE," "HOW TO WIN POULTRY PRIZES," "BROWN LEGHORNS," "WHITE LEGHORNS,"
"PLYMOUTH ROCKS," ETC.

HARTFORD, CONN.

1885.

INV. '60

LIBRARY
OF THE
U. S. Department of Agriculture.

Class ... 47
S+6 Hf



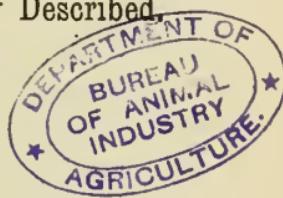
1007

HOW TO FEED FOWLS;

A TREATISE ON THE
PROPER FOODS FOR POULTRY,

*FROM THE SHELL TO MATURITY, FOR LAYING OR
BREEDING STOCK, AND FOR EXHIBITION OR
MARKET PURPOSES.*

The Kind, Quality, and Amount, Fully Described.



BY H. H. STODDARD,

EDITOR OF "THE POULTRY WORLD," AND "THE AMERICAN POULTRY YARD." AUTHOR OF "AN EGG FARM," "POULTRY ARCHITECTURE," "BROWN LEGHORNS," "WHITE LEGHORNS," "HOW TO WIN POULTRY PRIZES," "PLYMOUTH ROCKS," "POULTRY DISEASES," ETC., ETC.

JAN 27 1894

—
HARTFORD, CONN.

1882

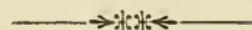
PREFACE.

To know what to feed, and how, and what quantity, is very important to every one who keeps live stock of any kind, especially poultry. A wrong practice in this respect may not only prevent profit, but result in down-right loss. Realizing the importance of the subject, and the convenience of a hand-book containing all the results of experiment, and all the recorded facts, we have gathered the material in this form, and now present to the fancier, farmer, and market poult erer, the results of our labor, believing that we have "left no stone unturned," and that nothing remains for another man to say about poultry feeding.

There may be new experiments, or new articles of food; but it has been our endeavor to make a book, exhaustive of the subject, a book that would satisfy the reader and fill the demand of the times, so that all known facts in regard to feeding might be grasped quickly, by any one, even the person just commencing to breed poultry.

The rapidity with which our books on specialties have sold, has encouraged us to make further effort. Whether we feed lambs or chickens, or write books to satisfy an imperative demand, let us do with our might what our hands find to do.

HOW TO FEED FOWLS.



Feeding fowls has been often and very justly compared to supplying a factory with raw material. Nothing can be more apt. And, just as the materials with which a factory is supplied may vary according to the nature of the manufactured article required, so the fancier must feed with due reference to his particular wants, and not go on in that careless, thoughtless way of giving one article alone to all his fowls, whatever be their condition or function, and then expecting equally good results.

We may feed for eggs and eggs alone; we may feed for young marketable chickens alone, we may feed for good round pounds and ounces alone, and finally for health and vigor in our breeding stock alone. In each of these cases the method of feeding and of our other treatment of the fowl will vary, must vary, if we are to make a good thing, pecuniarily speaking, out of keeping poultry.

To enable us to settle the basis principles of the business, a little scientific detail will be of some use. But the animal economy has become so well adapted to the very varying circumstances of life that feeding is not a matter of minutely exact calculation. A certain amount

of sulphur is needed to make a certain amount of sulphuric acid, and this amount can be estimated to the last grain; this is what we mean when we speak of scientific precision. But the relations of feeding are not exactly like these. If a hen gets to-day a few grains more fat than she needs, or more sugar than she needs, she can either work it off or store it up till to-morrow; if she gets a little less, she can draw on her stored stock, or can even go without, and wait for better luck next time. An animal body, in its relations to feeding, might be roughly compared to a merchant, with a balance at his bankers; a little more money to-day than his expenses and his balance grows; a little less, and he draws from his bank. So in estimating the precise value of different foods for different purposes; if we base our estimate altogether on the chemist's analysis, as if the last grain fed at any particular time were always used then and there, and for the needs of that particular time, we shall calculate badly. Some is stored, some may even be cast out undigested in the excrements; the amount actually consumed constantly varies with the circumstances of the fowl, the temperature, etc., etc., It cannot be a matter of very precise mathematics. Nevertheless a little scientific detail will be of some use in giving an idea of the gross relations of the question.

CLASSES OF FOODS.

There are three great classes of substances among those necessary to nourish the animal body.

I. *The Sugars (and Starches).* The sugars are mainly

used up in keeping the body warm, being slowly burned up in the lungs. The starches undergo the same fate, being first made into sugar, in the body, by the action of the digestive organs. Some small part of the sugar (or starch) may be also changed into oil by the same means, and this will happen if food, like rice, in which there is no sugar, be exclusively given, but at the expense of the health of the animal.

II. *The Oils (or fatty substances).* The oils also aid in maintaining the natural heat of the body, but are also very largely used in making nerves and are stored up as fat in very many parts of the body. Although some oil may be made out of sugar and starch, yet it seems to be essential to health that some oleaginous substances be taken in as such.

III. *The albuminous or nitrogenous articles.* By this is meant a large class of substances among which are the lean of meat, the curd (cheese) of milk, white of egg, the gluten of wheat, and the legumin of peas.

To the above, chemists generally add the class of the jellies, but these probably are useful, like the sugars, only as heaters. Jellies occur in meat as well as in berries and fruits.

If an animal be fed on any one or any two of the above alone it will die as certainly (though not as soon) as if it was deprived of food altogether. Most articles however contain more or less of all these.

In addition to the above matters, there are other articles just as necessary, which are therefore also foods. Air, water, salt, lime, sulphur, and so forth are all foods,

and must in some way or other find their way into the animal system.

The following table contains a partial analysis of certain articles of food most commonly given to fowls:

THERE IS IN EVERY HUNDRED PARTS, BY WEIGHT, OF	Flesh-forming Materials, viz. Gluten, Fibrin, Casein, etc.	Warmth-giving and Fattening Material, viz.		Bone Making Materials, or Mineral Substances.	Husk or Fiber.	Water.
		Fat or Oil	Starch.			
Beans and Peas...	25	2	48	2	8	15
Oats.....	15	6	47	2	20	10
Oat-meal.....	18	6	63	2	2	9
Middlings, Thirds or Fine Sharps..	18	6	53	5	4	14
Wheat.....	12	3	70	2	1	12
Buckwheat	12	6	58	1½	11	11½
Barley.....	11	2	60	2	14	11
Indian Corn.....	11	8	65	1	5	10
Hemp Seed.....	10	21	45	2	14	8
Rice.....	7	a trace	80	a trace	..	13
Potatoes	6½	..	41	2	..	50½
Milk.....	4½	3	5	¾	..	86¾

No such statistics as the above, however, will entirely indicate the relative values for different purposes of the various articles. For instance, beans and peas have the highest percentage of flesh-forming substances; yet, if they are not relished, the domestic fowl would not thrive under their use. Again, rice is indicated as having only a

trace of fatty matters ; yet rice alone is used in India and Madagascar as a fattening food, and Ellis, a missionary traveller in the latter country, says that fowls fed on it (and shut up during the fattening period), accumulate a layer of fat an inch thick. Of course this comes from a transfer wrought within the body of part of the starch into oil, a transfer already described.

We thus merely indicate some of the difficulties attending the direct and immediate use of chemical analysis in practice ; they are in truth valuable only as directing experiments, and occasionally in explaining the reason of certain results. Experience and it alone can be our guide, and to our own experiments and to those of the various breeders who have from time to time communicated with us as editor of the *Poultry World*, we shall appeal in the following pages.

ANIMAL FOOD.

The value of animal food in poultry raising, as might indeed have been reasonably predicted, is sufficiently shown by experience, and the careful breeder, whose fowls are not allowed to run, will provide for this want with the same care as for all the other requirements of his stock. During the summer a few fowls can, if permitted to range, provide for themselves in this respect and manage very well, but, as an acre will furnish insects enough for only twelve or fifteen fowls, it is at once evident that some extra provision must be made for larger flocks.

This foraging for insects is, among the French reduced to a system on some farms, the fowls being driven

out on plowed land early in the morning and back to their coops at night. Some poultry men keep their fowls in their orchards to the great benefit of both fowls and trees. Grasshoppers form a staple article, so to speak, for turkeys; their chief food indeed is insects of various species. Rosebugs are sometimes hurtful to young poultry in a mechanical way; the little hooks on their limbs fastening to the crop and to each other and thus causing a distension of this organ, fatal to the fowl in some cases. Some breeds will not forage as well as others.

The staple animal food throughout the country must undoubtedly be meat, in some form; and probably beef and mutton are as much better than insects for fowls, as oats are better than other grain for working horses. For small flocks the scraps from the table go a long ways, as not much is needed, and if too much is given the fowls become quarrelsome and the feathers come off. A good rule is to give a piece about the size of a medium grasshopper to each adult fowl, three times daily, chopped and minced so that it shall be duly shared by all. This rule will apply to Games, Hamburgs and Leghorns; Asiatics need more in proportion as their size is greater. Whatever is given should be perfectly sweet; the flesh of fowls decays much more rapidly if they have been fed on putrid meat (and the same is true of their eggs); they cannot therefore be healthful food, even when just killed. Too much meat is particularly bad for chicks, giving them weak joints, and yet they must have some of it, for they do not seem to be able to digest grain and vegetables fast enough to keep up their growth.

Where the table scraps are insufficient in quantity, animal food must be bought or otherwise provided, and there is much scope here for the ingenuity of the fancier, in order to observe rigidly the economy so necessary to his profits. Butchers' waste, such as the plucks of calves and lambs, may be hashed in a sausage machine, so also the livers; all these are best treated if boiled into shreds with much water. The brains from the fresh skull of an ox or a sheep or calf are much liked by laying hens. Young calves bought for the value of their skins are very convenient for large flocks; they are so tender that mincing is not needed. Hashed meat may be very well given in combination with meal, to make a thick mush; such a mush after being boiled will keep a week or two in cold weather. Cracked or pounded fresh bones have considerable meat adhering to them, but a great deal of fat also. A sheep's pluck hung up just high enough to compel the hens to jump in order to reach it will be found useful when fowls are kept in confinement. Eggs are excellent animal food, but for many reasons should not be given whole.

Tallow-melters' greaves rapidly throw fowls out of condition and are very fattening; they give a rank taste to the flesh. There is not much true flesh in them, but a great deal of fat and cellular tissue. Tallow itself belongs to the fats; it is frequently given, however, chopped quite fine.

Milk is an animal food, and a valuable one, especially for the younger fowls. Blood is also much liked by poultry, and probably few articles are more digestible, although

to the human appetite it causes disgust. To prevent fowls acquiring the habit of feather plucking through its use, mix it thoroughly with meal or mashed potatoes.

An interesting and rather important question is as to the value of fish, an article which is extremely cheap near the sea, and which will pay far better, if it can be used by fowls than as manure. The truth seems to be that, if recently used, they will impart a disagreeable flavor to both eggs and flesh, but if discontinued some five or six weeks before killing, as is the custom with those who feed swine on this article, the taste disappears. Young chickens may however, eat it daily without inconvenience. Sheldrakes eat much fish and are too rank for human consumption while the finely-flavored Canvas Back does not. The domesticated species of ducks are fond of it.

No fish should ever be used stale. Fresh fish may be chopped up raw with a little salt and pepper, or boiled and thrown out whole. Be careful, however to pick up the refuse lest it be eaten putrid and injure the health of the flock. Long clams may be crushed fine, shells and all, and fed either raw or cooked. The round species are generally too expensive for this use.

There is probably nothing better than worms and maggots, especially for young chickens, "to which a few maggots daily seem to give a peculiar smartness." They are soft and very easily digested. We will give several plans for breeding them, premising that one or two of these are offensive to the nostrils and should be carried on some distance from the house. Fill half a barrel with

fresh bones and leave it exposed to the flies half a day and then cover it with six inches of fresh loam. In two or three days myriads of worms will crawl through the cracks of the barrel, and present a ready prey to the fowls. A large piece of horse flesh hung up out of reach, or buried about a foot deep will produce plenty of maggots, dropping down to, or crawling up to the surface. If you live near a slaughter-house and can obtain the blood, cover some of it loosely with manure, which will be visited by the blow-flies and soon produce an abundance of large white worms. A good maggot pit may be made by putting in straw and horse-manure, with a sprinkling of yeast, and some mashed potatoes and Indian-meal, all covered with soil one inch thick. One muck fly lays five hundred millions of eggs in a season, producing maggots nine days after laying. To produce meal worms for young chicks, get two or three hundred and put them in an earthen jar, with scraps of old leather and other refuse mixed with bran and damaged meal. Place some cotton waste on the mass and keep it moist with water. The worms will multiply enormously and in sixty days can be used for daily feeding. They can be got in bakeries or wherever flour is much used and are really a clean animal, despite of the disgust which we feel with regard to them. This may be also done in winter, the jar being put into a warm place.

In conclusion, the question may asked if fowls can be kept on animal diet altogether. Probably not, at least not well, although breeders are not unknown who use nothing else during the entire winter. Probably fowls

would starve very soon on the pure *lean*; most meat has more or less fat, and it may be observed here that the reports on the whole subject of animal feed are defective because no attempt has been made to discriminate between the fat and the lean. Men do live on meat alone in which there is a small amount of all articles needed for nutrition, but it requires a great deal, and a corresponding amount of vigor in the digestive organs, in order to get the amount of sugar necessary for supporting life. It is reported by some breeders who have tried the experiment, that their fowls seemed to thrive for a while, but soon died. Game cocks may have a larger proportion of meat than other fowls, to keep up their natural pugnacity. Guinea fowls and turkeys need a great deal or its equivalent in milk or insect forage.

GREEN FOOD AND VEGETABLES.

Under this class is a large number of miscellaneous articles, some of which undoubtedly act rather as vegetables than from the property of freshness commonly sought in green food. The list comprises grass, and grass seeds, green corn, cabbages, clover, purslane, young beets, garlic, onions, leeks, lettuce, turnips, pumpkins, apples, kohl rabi, carrots, etc. Wild fowls of most species go to the South in the winter, and get what they need there.

The importance of a proper supply of such articles is very great. Fowls with a free run consume a great deal of grass, eating it now and then through the whole day and in fact with what they eat and what they

trample down, two hundred will destroy all that will grow on an acre of ground. The Malay fowl particularly, eats a great deal of this sort of food. The goose is as much of a grazing animal as the cow and needs the best and finest grasses to do best. A little seems necessary to keep all fowls of all ages in proper condition, too much, however, or any rapid increase in the amount given causes diarrhoea, as a large part of what is taken in is not properly digested, and the residue serves as an irritant. To teach fowls to eat green food in winter, mix it at first with their meal, although boiled potatoes and raw cabbage will be devoured without any preliminary training.

Cabbage is considered by many the best article, but is more expensive than some other kinds. It is apt to get too wilted for winter use, and it has therefore been recommended to put it down in the form of sauer kraut. This is prepared as follows: Line the barrel, tub or jar with cabbage leaves, and put in finely shredded cabbage in a layer three inches deep, well pressed down and sprinkled with four tablespoonfuls of salt. After five such layers have been built in press down hard with a piece of board cut to fit the inside of the barrel and to thus press on the whole. Repeat the process until the barrel is full, pressing down every four or five layers. Cover with leaves, and press it down with a heavy weight. Let it ferment three weeks, then skim, and cover with water. Keep in a cool dry place.

No doubt the process of ensilage may be turned to most excellent account in poultry feeding.

Grass may be given finely chopped, mixed with the soft food, and for this, the fine cuttings from lawns are excellent or tender grass can be stored for use during the day after cutting in the morning when the dew is on. Rowen or dry, chopped hay is used in winter, or hay may be made into a bundle for them to peck at. Hay meal is now an article of commerce, but is perhaps not always pure and good. Rowen and hay may be soaked for an hour or two in water and thus greatly improved. Sods may be cut and thrown into the coop or stored for the winter, but ought to be so large as not to be easily pulled about. In autumn, land may be seeded down with much grass seed and a little wheat for the coming spring, when the wheat will first be eaten and then the grass. Clover is chopped fine for this use.

Chopped leeks or onions keep off vermin it is thought, perhaps by the odors coming through the skin, and they will be very much appreciated by young chickens, particularly the young tops. They impart, however a temporary flavor to the flesh and ought to be withheld a little while before killing the fowl.

Turnips of all kinds are much liked. They should be chopped up, outside skin and all, as the outside skin has a kind of spicy flavor that will stimulate digestion, but it will not be eaten unless thus treated. Stone turnips may be boiled with one half corn meal to vary the diet. Sixty Plymouth Rock fowls will eat in winter six quarts of yellow globe turnips every two days—to give a notion of the quantity required.

Kohl rabi is tender and does not need chopping, the

large late green is best for fowls, and one or two rods will yield enough for fifty hens during the winter. Cut one in two and hang it up for them to jump at. This vegetable sometimes affords a sure crop where cabbages often fail.

Common purslane (pusley), is very useful in the summer, and may be cut fresh, when the dew is on and given at the rate of a peck to every fifty hens, chopped and mixed with the morning feed of scalded meal. It is very juicy but must be used fresh. Ripe cooked pumpkins may be used in the same way, but have not very much substance.

Green corn is cheap at times when the garden supply outruns the home consumption and may be cut up, after having removed the coarse shuck leaves, so as to make several pieces to the ear and thrown to the fowls. All kinds of corn are good, used in this way, even the common yellow article. The succulent milky seeds are very much relished. It is particularly good for growing chicks.

Dandelion leaves are immensely relished by young turkeys. Potatoes are sometimes fed raw in winter chopped fine when other vegetables cannot be procured. Cheap apples (seedlings or cider apples), may be chopped and given to geese and other poultry. A bundle of corn stalks to be pecked at is a good thing in winter.

On the whole, for summer, newly grown grass, cut with a lawn mower or a keen scythe when about one and one-half inches tall, and for winter plenty of rowen run through the hay cutter and soaked in water

in conjunction with a small allowance of good cabbage are the best, economy and all things considered.

GRAINS.

Corn (Maize).—This grain may be fed whole, cracked, or ground, or cooked. As brought from the miller the cracked corn may be sifted and the coarse pieces fed dry, the fine scalded. It may be cracked economically in a mortar and thus a good article is secured, as the article sold is often made from poor and mildewed grain. Besides it should be used only when freshly cracked, as in this form it soon spoils and is much harder of digestion—opinions differ as to whether the whole grain should be largely used or not; It certainly is much used thus in America, and without bad results. Many dislike it and opprobriously call it the “lazy man’s blessing.” It is condemned most of all for confined birds and for laying fowls. It does not seem as if whole corn ought to be improper food for an animal that will eat pebbles.

Ground corn is generally given as dough; too often as sour dough, which ought to be particularly avoided. In this form, however, it is very fattening, and not good food for the laying stock. Indeed, corn in no form, to the exclusion of other grains, is to be advised for layers. A thick dough is best; this should be mixed with a little salt and cayenne. A good mixture is scalded meal, wheat bran, and turnips and potatoes, one third to be meal and one third bran. A very good meal is made by grinding corn and cob together, with one tenth good bone-meal, to be given twice or thrice a week. For corn

burned on the cob, see "Charcoal;" for methods of cooking, see "Cooked Food."

Of corn in general, not much need be said. It has very little bone substance, and a great deal of available fattening material. It is our main reliance in fattening fowls. For this purpose it should be used in more than one way, so as to produce variety, raw mush being used one day, stiff dough the next, whole corn occasionally, and so on. For other purposes, it is the opinion of many fanciers that it ought not make up more than one third to one half the food. It makes the yolks of eggs dark yellow. One bushel of corn produces twelve and one half pounds of eggs and nine pounds of live and seven and one half pounds of dressed poultry. Fowls accustomed to corn must often be starved into taking any other diet. In English poultry books, "corn" often means wheat.

Oats.—Oats and oat-meal are very different things, as so much of the husk is thrown out in grinding, making the meal rather more fattening. Of course it is also more expensive. Some breeders like oats ground, not "thin husky horse meat bruised," but good, heavy white oats, thirty-six to forty pounds to the bushel, ground up husks and all, so fine that the husks cannot be seen. But there is some difficulty in getting it so ground. The new kinds, Excelsior, Australian or Surprise weigh forty pounds to the bushel and are better therefore than the common sort. Oats stimulate without enervating or fattening, and form a good diet for taking down the fat of hens too fat to lay. Ground oats with boiled potatoes have been \

found excellent food in producing more fertile eggs and vigorous chickens. One fancier reports good results from oats, fed as three-fourths of all the grains used; having tried this system thoroughly with Brahmans and Cochins. Oats and corn ground up together, do very well, the corn furnishing the fat material. The heaviest samples of oats should be bought, as the difference comes not from the husk but from the meal. One bushel of oats at thirty pounds equals sixteen pounds of meal and fourteen pounds of husk. One bushel at thirty-six pounds equals twenty pounds of meal and sixteen of husk. Fowls often refuse the lighter oats but all will be eaten if swollen in water over night.

Wheat.—The grains may be fed whole, crushed, or cracked. The wheat may also be swelled in cold water for three to four hours. The tailings may be used and are richer in flesh forming material than the better wheat. Bran may be given scalded or stirred into a mash with hot potatoes, but should be alternated with whole grain. Bran, five parts and middlings one part, make a mixture much preferred to meal. Moistened bran seems to scour in winter more than the whole wheat. Wheat meal has about the same qualities as the grain.

Wheat is a dear article of food, generally, but is very much liked by fowls. It is rich in material for growth, and stimulates the egg function. It seems to be easy of digestion, although too much of it sets up a diarrhoea. It should be given less freely than corn. Wheat screenings are full of seeds, often of poisonous plants, and fine dust; all this must be eaten, if the

screenings are cooked, therefore feed them raw. In reading English poultry books, notice that wheat is often described under the name of "corn," our Indian corn being called "maize."

Barley.—Barley meal and the whole grains have very much the same character, except that the meal is generally made from a poorer article. A good part of the barley that is swallowed does not however seem to be digested, and this is one reason, in addition to its chemical constitution, why it does not seem to fatten well. Fowls will thrive on it for a while, however. Barley malt is of but little use; it must always be fed fresh. If used too freely, it scours. A sprinkling of malt dust, though, is a useful condiment, as it will make fowls eat almost anything. Barley is sometimes accused of making the flesh of ducks insipid and woolly, or as it is termed "chickeny." Barley may be steeped in water until it sprouts a little. In America it will never be a favorite article of poultry food as in England, its place here being filled by Indian corn, and in many places it cannot be purchased at all.

Buckwheat.—According to Wright, who however, writes from a country where maize is little used, fowls like buckwheat better than any other grain, after they get accustomed to it. It is the staple food in France, and is said to be valuable in whitening the flesh. It is thought by some too fattening. Fowls if confined and fed on it, with little green food, soon lose their relish for it, and get out of condition. Too much of it may also scour a little. Used to make a glossy coat. It is said to produce

pale colored yolks. For cooking buckwheat, see chapter on "Cooked Food."

Rice.—Rice is the cheapest grain food in some parts of the south. Inferior qualities of it are cheap everywhere, and are good when the inferiority consists merely in its being broken or dirty or in the slight wetting of the casks at the top and bottom. When boiled it swells very much, but the added bulk is not added nutriment. It contains little flesh-forming material or fat and would therefore seem to be good for nothing for fattening (although much used in India for this purpose), nor for laying birds. It is thought to whiten the flesh. Is extensively recommended for chicks one week old, and is said to be better than corn meal. The rice swept from the floors of store-rooms and from wharves and vessels where it has become scattered may be sometimes bought very cheaply and is nearly as good for feeding poultry as the full-priced article.

Millet.—This grain is chiefly valuable on account of its small size, being suitable for feeding chickens during the first three weeks of their lives. Very small chicks need very small grains. They constantly search for the seeds of grass or small seeds. Nature is the best teacher. Small whole seeds are the best thing in the grain line that can be afforded to young birds. Golden millet is the best variety.

Rye.—This is the poorest of all grains and should be used only now and then for the sake of variety. A clear rye bran, fed alone, may swell and "cake" in the crop, and cases are reported where it proved fatal to the

fowls eating it. Mix it with oat or corn meal or wheat bran.

COOKED FOOD.

The advantages of cooked food are too well-known to need lengthy discussion here, and are particularly well-known to the breeders of domestic animals. Experiments have been made very often that prove its value. It has been objected to as not being so natural as raw food, but our domestic stock is bred far from the condition of the wild species; the demands made on them, for instance in the egg capacity of the fowl, are much greater and this makes a new or second nature, whose demands must be met. It may be added that in its softening effects cooking is a process not without analogies in ripening. Cooked grain is more nourishing, and if over-fed appears to be less injurious, because more easily disposed of. Fowls do not always prefer cooked food, however, and they will not touch cooked corn if the uncooked grain is to be had and the latter is said by some breeders to make the flesh somewhat finer and nicer. Cooked food also fattens more quickly, probably because it is more completely digested, which is of course equivalent to saying that it will go farther than raw food; one-third less food is needed. But one should be somewhat sparing of its use for the laying and the breeding stock as it appears to favor the development of fat about the ovaries. In general, one half of the food may be cooked, and in cold weather may be fed warm. Of course the fancier, who has been accustomed to give a

certain amount of food raw, will make a serious mistake if he gives the same amount cooked, and will be likely to have trouble from over-feeding. It should always be given fresh, not stale. In large scale operations there should be a special cook-room, also used as a work-room, and the room above, if furnished with a drum will be warm enough for young chicks in February.

Soaking grain over night answers to some extent the same purpose as cooking, and offers an advantage over the raw grain, in that the kernels are already swollen, and do not have to undergo this process in the crop. The first grains fed to young chicks should be prepared in this way.

The process of fermentation also softens grain, and, by turning the starch into sugar, makes it still more easily digestible. But brewers' grains should not be used exclusively as food, since it, like any moist food, is apt to set up a diarrhoea

Corn, may be boiled on the ear, or if the shelled kernels rest on a perforated plate at the bottom of the pot they need not be stirred during the boiling. Steaming the corn by setting it to stand over hot water in a covered vessel, gives very satisfactory results.

Wheat may be treated in the same way, but the screenings ought never to be cooked, on account of the quantity of foul and mayhap, poisonous seeds mixed with them. If thrown upon the ground the latter will likely be rejected.

Buckwheat is very nicely treated by putting the whole grains into a covered boiler, with just enough water to

cover them, and letting them simmer for seven or eight hours. The grains swell very much like rice.

Unleavened cakes of corn-meal, either by itself or mixed with ground wheat or oats may be baked for young chickens as mentioned in the section for feeding young birds.

Most of the vegetables mentioned above, under the head of "Green Food" as useful fed raw, may be cooked to advantage and mashed, when they may be mixed either with grains cooked, in the kernel or with the meal, either raw or cooked and with finely hashed fresh meat as harslets, plucks, livers, etc. Potatoes, carrots, turnips and beets may be thus used. Potatoes and Swede turnips are the best and beets the poorest.

Milk may be clabbered or turned to curd either by applying warm water or by heating the milk gently by placing it over a kettle of boiling water, letting the steam affect it. In no case should the sour milk be scalded, as that renders the curd too tough and leathery. The whey may be drained out through a colander or a common cloth strainer. When the whey is thoroughly out, the curd will assume a crumbly condition, when it is just right.

MISCELLANEOUS ARTICLES.

Brewers' Grains, cooked beans and peas, ground broomcorn seed, ground acorns, hemp seed, ground coconut the refuse from factories where prepared cocoanut is put up for culinary purposes, are all used sometimes. An excellent poultry hash may be made out of

meat boiled and minced, mashed potatoes, wheat bran, corn meal, and oat meal, with a slight sprinkling of bone dust, salt and cayenne, the whole mixed with the liquor the meat was boiled in. Chandlers' scraps soaked over night in cold water and afterwards minced, may serve in the place of meat. A dough may be made of any grains ground mixed with cold water. It should not be fed very moist, but rather stiff and dry, so that it might be rolled out, if needed. Too wet food causes diarrhoea, dilutes the intestinal juices too much and soon knocks chickens off their legs. Always salt and pepper it a little. A good dough may be made of corn-meal, oat-meal, wheat bran and boiled vegetables mashed in the proportion of one third of each, and wet with milk or water, the former preferred.

Sunflower Seeds.—These are not so much used for food, although they are good for this purpose used exactly like grain, as for improving the gloss of the plumage. This they do from the great quantity of oil they contain, and they are useful in preparing fowls for exhibition; fowls enjoy them, and get a great deal of exercise in splitting open the seeds. It is asserted, however, that their overuse will cause swelled crop. The Russian is the best variety and has an immense flower. They will grow on any land that will produce white beans though rich land is the best for them. Plant in rows two and one-half feet apart, in hills one and one-half feet apart. Put two or three seeds to the hill and thin to one plant.

Milk.—The analysis of milk is partly given in the

table already presented. Skim milk differs from this by having lost nearly all of its fat-producing constituents, though not quite all, and whey by having lost both fat and flesh-producing constituents, leaving only the sugar and certain other substances. Thus it will be seen that its value is very variable in these different forms. Nevertheless it is, in all forms, much relished by the fowls as a drink, and some fanciers depend upon it instead of water. If it is substituted, and fresh, sweet, unskimmed milk used, it is evident that very much less flesh food is needed. It is very valuable for young chicks, as it contains all the materials necessary for growth, representing both meat and drink. See "Cooked Food," for a good method of preparing it for this purpose. It is, nevertheless, not a natural food for them in the sense of answering all requirements. The little gizzards need to be set into activity, and millet, dwarf corn, or some whole seeds are imperatively needed.

In comparing the value of milk in raising poultry and pork, it is estimated that it is worth twice as much for the former. Fifty hens, in winter, if kept on dry feed will drink two pailfuls a day. It may be used instead of water for mixing up meal mash, which is thus rendered more palatable, although, as the amount of liquid used should not be great, the difference in the amount of nourishment is not much. Skimmed milk can be used and a little fat added to make up for the cream removed. Milk-fed fowls are sometimes said to lay lighter colored and more insipid eggs.

Gravel.—Hens need some hard substances with the

food to act together with the gizzard in grinding grains, and this need should be carefully provided for. It is too often neglected, especially at exhibitions. They swallow hard substances without much discrimination (although they will swallow no more than they need), as pins, and broken glass, and in this way may, through the wounding of some part of the digestive tract, be killed. They prefer clean white pebbles to brown ones, either because more conspicuous or because generally harder. The gravel used should be not flat but rounded, and if there is none at hand break up granite or quartz rock for this purpose.

The pebbles come away with the excrement, and may be swallowed again and again until they are polished perfectly smooth, in which case they are probably of less value, and new ones should be furnished. Pounded glass is sometimes given, but if fine is probably of little use, and, if coarse, may do fatal harm. Do not think that finely pulverized oyster shells will answer the purpose; these are good as supplying lime, but the gizzard requires something not flat or scaly in form. The shells of the long clam are liable to the same objection, those of the round clam or quahaug are more angular, and serve the purpose of gravel and also give a supply of lime. One can hear the gravel grinding in the gizzard, especially in young ducks.

Lime is needed by all fowls for the growth of the bones, and for shell material, and fortunately occurs in the grains and in most kinds of food, to an extent sufficient for wild fowls, which lay but few eggs a year.

For, the hen, however, whose egg organs are stimulated to so great a degree, special provision must be made. The shells of twelve eggs weigh about two and one half ounces, so that the ordinary laying fowl needs about twenty-five ounces annually, on a rough calculation.

This demand can be met in various ways. Those living near the sea can use quahaug shells, or oyster shells. If the latter are fed perfectly fresh, they may be crushed and given at once; but if not fresh, they ought to be heated to a red heat, to burn up the putrescent animal matter in them, which may cause disease. (Twenty-five hens will eat one pound of oyster shells a day.) The same may be said of crushed or granulated *bone*; the little particles of flesh adhering to it, the fatty matter and the marrow contribute valuable animal food, but only when perfectly sweet. Granulated bone may be used for adults, and bone-meal for chicks.

Some poultry keepers prefer to bake rather than to burn the bone; this will cook the animal matter indeed but does not drive it off. Ground bone is a valuable article for young fowls with a tendency to crooked breast bones, when the deformity is owing to general want of firmness in the skeleton, and not to an accident. Old mortar is sometimes used, but the lime in it is not in a suitable state. Lime-water is a good article. Throw a piece of lime into the drinking water. Gypsum will not answer, for it is a sulphate of lime; carbonate of lime is what is needed. Oats and wheat contain more lime than other grains, and may be fed with a view to this purpose. A good recipe is the following: One peck of the

ash of burned bones or powdered oyster shells, one pound flowers of sulphur, one peck of wheat bran. Give daily to sixty fowls, one pint, mixed with a little scalded meal used moist enough to cause the mixture to adhere to it.

Egg shells are dried and stored by some poultrymen, and fed for this purpose. If used they ought to be finely pulverized, lest the hens acquire the habit of eating eggs.

CONDIMENTS.

The use of condiments is advisable as producing better digestion and more healthful growth, and also because, in moderate amounts, they improve the flavor of the flesh. Wild gallinaceous birds of all species obtain a supply from various spicy berries and buds, the grouse eats quantities of spice bush berries, but in the domestic fowl we must supply the want artificially. Cayenne pepper is one of the most useful articles of this nature, although ferociously concentrated, and is probably the cheapest. In buying it, be careful about its quality; much of it is highly adulterated. A slight sprinkling is all that is needed, especially at first; it may be increased afterwards, as the fowls learn to like it better. A good rule is to season as if for your own food. It may also be put into the water; but if the water is made too pungent, they will not drink it. To make it less concentrated, boiling water may be poured on it, and the water with the pepper, may be mixed with the soft food. Cayenne is particularly valuable for laying fowls. The

red pepper of our gardens affords an excellent substitute, the pepper tea being mingled with the food. It is essentially the same plant as cayenne.

Next to cayenne pepper, must be mentioned salt, which is however, even more necessary, being an article of food as well. About as much may be used, as one would use if preparing the food for his own consumption. There is a wide-spread belief that salt is injurious to poultry, and it seems to do harm if eaten crude and in great quantities. It ought to be melted and diffused through the mass of food. It is recorded, that a mess of potatoes, boiled with corned salt beef killed a number of fowls, and salt fish thrown to poultry too liberally has resulted in the same way.

Mustard and ginger may be used to vary the condiments; sprinkled on the food occasionally instead of cayenne. Grated horseradish is useful. All these are needed most in cold weather and when fowls are being fattened, but for the laying, and especially for the breeding stock stimulation of the digestive organs by these means should be resorted to sparingly. Onions, leeks and garlicks act as condiments and stomachics in addition to serving as food. The genuine Imperial Egg Food is a valuable condiment, its ingredients consisting largely of a judicious combination of various stimulants and aromatic substances, including cayenne, with carbonate of lime and other constituents of eggs. Giving stimulating or spicy stuff judiciously is not so much an artificial operation as it is a returning to natural conditions,

FEEDING IN GENERAL.

Frequency of Feeding.—Adult fowls should be fed twice or three times a day; breeders vary in their practice in this regard. There is evidence enough that they will do well on only two meals daily, but on theory it would appear that the oftener the better, provided they are not over-fed. Young chicks should be fed much oftener than adult birds. For details, see article on "Feeding Chicks."

Quantity.—Too much food is as bad as too little, and is even worse, if the fowls are allowed to run, as in this case they will pick up much for themselves. A good rule is to stop feeding when they cease running after it. As a rule, fowls eat in proportion to their size. Some breeders keep grain before them all the time, and claim that in this way less is used, but as this is quite likely to be due to disgust, it is rather a sign of evil than of good. Food that lies about much is apt to get sour and to bait rats and mice to the spot.

Times.—The last meal should be given at night, just before the fowls go to roost; this is particularly important in winter, so as to secure during the night that warmth that accompanies the consumption of the food in the system. This is the best time also to give whole grain, as it is slower of digestion. In the morning, before feeding ascertain if the crops are empty. If not, do not feed, the water that they will now drink is all that they need. The morning feed should be warm and soft especially in cold weather.

Method of Feeding. — The natural manner in which wild birds find their food is well worthy of imitation, especially as experience shows bad results from violating this. Wild fowls find their food slowly, but little at a time, and as a result of considerable exercise. On the contrary, breeders too often throw down great quantities of food in such a manner that the fowl can at once obtain a full meal, and this is done all the more hurriedly, on account of the rivalry of the rest of the flock. In this way fowls overload the crop, drink too much water and perhaps suffer from swelled crop, or because they do not give the natural sense of satiety time to manifest itself, and are apt to eat much more than they need.

To obviate this, the food should be given in such a way as to secure slow feeding. Whole grain may be buried in leaves or straw, or lightly raked into loose soil. Grains may be fed on the ear. All this will secure exercise which is also beneficial in keeping the hens out of mischief.

Variety — It is important to arrange the feeding so as to secure a suitable variety, as otherwise the fowl will not eat with so good an appetite nor digest so well what has been eaten. Every fowl ought to have every day one of each of the three kinds,—grains, fresh vegetables and animal food.

It is probable also that some of the constituents of food which exist in such small quantities that the chemists do not commonly take note of them in drawing up schemes for feeding, are as important as the more com-

mon substances, but have to be obtained from different sources.

A little thought is all that is necessary to secure variety; the other kinds of grain may be given now and then instead of the wheat or corn so commonly depended on, or whole grain may be varied with cracked grain, or ground grain; raw dough with cooked dough, and so on. Mixtures of the various grains as a steady thing are to be avoided, as making it difficult to secure variety. The animal food and the vegetables offer opportunities for almost endlessly varying the bill of fare and the breeder on a large scale needs especially to be warned against falling into one routine, or the confined use of one kind of these foods. Fowls running at large cater in variety of food for themselves. For a few fowls, also, the table scraps go a great ways toward making up the deficiency, for these are of very diverse characters, as we take care of ourselves in this matter of variety, if not of our fowls. Even the monotony of corn feeding in fattening ought to be relieved a little, if we wish to secure the best results.

Exhibitions.—Much harm is done to fowls by careless treatment during exhibitions, and especially by not providing plenty of clean gravel, green stuff, etc., all the varieties of small things that the fowl is always needing. Before the exhibition, sunflower seed, or hempseed, or buckwheat may be given to improve the general appearance of the fowl, especially of the plumage. Carrots, and flax-seed also give a gloss to the plumage. After the exhibition the fowl is frequently not in a condition to relish

its ordinary food. Give bread soaked in warm ale and a teaspoonful of castor oil; next day give only soft food, and after that go on again.

Cost and Quantity of Food. — Food for fowls is more expensive, in proportion, than for other animals. A good healthy growing fowl needs weekly about a pint and a half of corn or wheat. A bushel of corn produces nine pounds live weight, seven and one half pounds dressed weight or twelve and one half pounds of eggs. In the first volume of the *Poultry World*, page 76, and in the seventh volume, page 288 are some interesting reports on the comparative cost of a pound of flesh in different breeds. These are well worth examining, but it is obvious that the cost is going to vary widely according to a multitude of special circumstances. No one needs to be told that a small flock of fowls which forage for themselves can give no basis of estimate for a flock of a thousand all whose flesh food must be bought, and whose green food must be gathered at the expense of labor.

Leghorns will eat one third less than Brahmans or Cochins while not laying, but during the laying term, or just before it, the quantity of food consumed is governed more by the prolificness than by the size of the bird. Before the laying commences there must be a storing of material in the system, that there may be a reserve to draw from. It is not probable that a fowl can digest enough food each day to furnish material for an egg, and meet the other demands incident to her life. When the reserve is exhausted then comes a time of rest.

FEEDING FOR LAYING.

Under this head we shall speak of the production of eggs for the table, and not for incubating purposes. The egg-laying function cannot be acted upon as directly as many poultry writers seem to think, nevertheless it does appear that some articles of food have more connection with it than others. A good hen ought to average one hundred and twenty eggs per year, although the average of some breeds, under favorable circumstances, rises as high as one hundred and fifty. This implies the separation from the system of a large amount of material, since one hundred and twenty eggs represent an average aggregate weight of sixteen pounds of nutriment in its most condensed form, and one hundred and fifty eggs an aggregate of twenty pounds. Of this amount a little more than one tenth is fat. All this requires also not only a surplus amount of material but also of energy in secretion, and if this be remembered, it will become evident that mere feeding of the extra food will not prove sufficient. If the constitution is in a weak state some of this extra material may be simply stored up as fat, without undergoing the complicated changes productive of the egg, or it may pass off undigested, and perhaps, by irritation, and the diarrhoea following enfeeble the health still more.

Another thing to be remembered is that vitalized, productive eggs are one thing, and eggs for food or for sale are a different thing. If we could manipulate a hen altogether to our wishes, the best policy would be to cause the breeding stock to produce but one or two

clutches, as these would prove far more fertile, and produce chicks of far greater constitutional vigor.

A fowl begins to lay at about ten months. She can not be economically used as a layer through a very long time but only for a period of several months. During this time she eats more than at any other; the digestive powers are put to their utmost stretch to dispose of so much surplus nutriment; the reproductive system compresses into a very short period far more work than was ever meant to be accomplished in the life time of the fowl, and the consequence is, as it has been happily phrased, "a used up machine" in a very brief space of time. During the moulting period the laying is of course suspended; also during a very cold season, if the fowls be exposed, the reason in both cases being the same as already implied above, namely, that the nervous system is fully charged with other cares, and it is not probable that great excess of nutriment at this time will make any difference in the egg product.

In feeding for eggs now, some judgment is needed to steer between the two extremes, of insufficient nourishment, and of over feeding. An overfed hen will not lay well. The fat is deposited thickly upon the ovaries, and whether by this local hindrance or by the general constitutional condition, the process of ovulation comes to a stand still. The practical rule is to feed well but to avoid excess of those foods known to have a particular tendency to fattening, such as corn, and warm, cooked food, and all other conditions that favor fattening, such as close confinement. Yet corn may be used to

some extent, partly for variety, partly because some fat is needed. Wheat, or wheat bran, is an excellent article for the purpose, as it contains much of the peculiar material that contributes to the perfection of the white of the egg. Rice has been called worthless as a diet for layers, though from its chemical constitution this would seem too radical ground. Meat has an almost invariable connection with a great production of eggs. Meat used for this purpose ought to be both fat and lean, and the fat would partially supply the place of corn. Ground bone and milk are also worthy of high praise.

Whatever is given ought to be in such a form that it shall be easily digested. Whole grain alone requires some considerable amount of nerve power to digest it. The fowl no doubt, is "up to it," but you want surplus steam for your egg factory. As the laying hens grow older, and come nearer and nearer the close of their period of egg production, the diet should become more and more stimulating. Chandler's scraps may now be given in increasing quantities and cayenne pepper be used more and more freely. As in fattening, so in laying, you are running a race with disease and must accelerate your speed.

The egg shell must be also provided for, and some form or other of lime be given (see previous section on Lime). However, thin-shelled eggs are not always due to a deficiency, here, but are often one of the first signs of general overfeeding. So if you have given plenty of shell material and despite of this still get thin shells, feed your stock much more sparingly for a

while. A good mixture, combining shell material and digestive material, consists of ten parts of pounded raw oyster shells, two of cayenne pepper and one of powdered sulphur. Give two heaping tablespoonfuls thrice weekly to twelve hens. The oyster shells must be quite fresh if used raw.

FEEDING CHICKS.

Thoughtless and careless feeding is the cause of a large percentage of the deaths among the youngest chickens. The main differences between these and full-grown fowls in this respect are due to the much more feeble grinding power of the gizzard, and to the fact that the rapidly developing muscles, bones and feathers demand a greater (relatively speaking) supply of flesh-forming and bone-making substances than is given to adults. The crops are also less capacious in proportion to the size of the bird, their proper food is more rapidly digested and therefore they need to be fed oftener. Greater care is needed in keeping everything fresh and sweet.

For the first day no feed is needed; the remnants of the egg still continue to afford nourishment. After this, feeding may be begun, and it seems natural to continue their egg diet on which the chick has hitherto lived. Begin therefore with yolks, slightly cooked by being dropped into hot water, not boiled, mixed with stale wheat bread crumbs or an equal quantity of crumbs of corn-cake, made by baking a dough of Indian-meal and milk. The bread crumbs are most approved, wheat having more growth material than corn. Some breeders con-

tinue the use of eggs for six weeks, and report, as might be expected, that the chicks do admirably under it. One egg daily for six to eight is sufficient at first, but during the first three weeks may be gradually increased to two per diem. Feed every two hours during the first week, beginning on removal from the nest. Very weakly chicks may be fed, if worth the trouble, with raw egg beaten with brandy and given through a glass tube. The English have a practice, not to be approved, of cramming with pepper-corns and grains of barley. The chicks will swallow clean white sand of the size of mustard-seed, and it should be given them at the start.

At the age of one week, the egg may be gradually changed for boiled plucks and livers, chopped very fine. As already hinted, chicks need rather more flesh-food, in proportion, than grown fowls. Too much, however, seems to cause weak limbs, deformed toes, and loose joints. Coarse Indian-meal may be given, cooked as a thick, crumbly mush, and should be not too wet; too wet dough destroys a great many young chickens. Corn-meal mixed with cold water often scours young chicks. Tegetmeier recommends a mixture two thirds sweet coarse oatmeal and one third barley-meal, mixed with milk or water. Dough should always be mixed fresh, as it soon sours, especially if made with milk.

For variety, try wheat-bran, and ground oats, mixed with corn-meal. The green food must not be forgotten. Give all they will eat of tender grass, chopped very fine and mashed boiled potatoes. Onions and cabbage cut very fine are much enjoyed from the first till the last.

Oats planted in boxes and set in a warm light place, in winter or early spring, soon give plenty of green fodder. The green food may be discontinued when the chicks get large enough to pull it for themselves, and they may be allowed to run anywhere, as they will do no harm in gardens.

As they get older you may gradually get into the grains. Good success is reported from the use of rice alone, and that almost or quite from the first. Cracked corn (freshly cracked) and crushed wheat screenings do for the beginning; give them mixed half and half. As they grow, the smaller grains of corn or wheat may be given, and after they are well feathered out, corn may be more extensively used. But the meat diet must still be persevered in; chandlers' greaves are useful, if very nice and sweet. Maggots seem to agree with them particularly well, and it is well worth while to go into the somewhat unsavory business of breeding them. [See Animal Food.] Milk "fills the bill" very well, and skimmed milk should be used as the drink for the first two months. Curds and clabbered milk are excellent, and buttermilk is not to be despised.

The feathering time is particularly critical, and requires careful feeding, with bone-dust added to the diet. A little powdered sulphur and charcoal should be added occasionally.

The feeding time should be regular, and may be gradually rendered less frequent. After the third month, five times a day is best, although they will do fairly well if fed thrice daily.

FATTENING.

The fat that is found in an animal must be regarded as stored for future use, and not probably as subserving any particular purpose in the animal economy. If a fat fowl be deprived of food, it does not, as is well known, immediately die, but first draws upon this stored fat as it might from a pork barrel or from a jar of lard, and this will maintain both the life and the animal heat for a certain time. Nevertheless, a certain amount of fat seems to be deposited in the tissues, and retained there, in all animals, nor does it entirely disappear even in cases of the most prolonged fast.

All fattening beyond the regular amount must be understood to be an abnormal condition, a diseased or at any rate an unhealthy condition, and if this be kept in mind, it will not be difficult to understand how it is that fattened fowls begin to fall off after a certain time, and particularly what happens to geese fed as they are at Strasbourg for the purpose of getting the liver into a particular condition. As to the exact amount of time that fowls will bear the fattening process before they begin visibly to suffer, poultrymen are not quite agreed, and no agreement ought to be expected. It is exactly like asking how long it will take late and unhealthy suppers, and riotous living generally, to kill a man; as all depends upon his previous physical condition; if in poor health when he began, it will take less time than if he had been in robust health. Again, much depends upon the condition of the digestive organs. If they are in excellent order, then all the food taken will continue to

be digested and produce increased weight, if they are not in good order, only a part will be assimilated and the rest will run off, or even cause diarrhoea, which will quickly reduce the fat already stored away in the tissues, and carry much of the muscular fiber with it. Of course fattening fowls increase to some extent the bulk of their muscles as well as of the fat deposit.

From these considerations, it will be easily seen why some breeders kill in ten days after the fattening has been begun, and others in two, three or four weeks. Your observation must guide you in this, with reference to your own stock. In general so long as you are producing four cents worth of flesh by two cents worth of feed, keep on. When they have attained the point where they will get no fatter, kill at once, or they will suffer from the strain the whole process has put upon the constitution. No operation with fowls requires greater experience and attention than this, and, in Strasbourg, the men who can tell just when a fowl is going to die from the treatment to which it has been subjected, so as to anticipate its death by a speedy decapitation, command, it is said, very high salaries. It is agreed upon all hands that the faster the process is carried on the better, one reason being that the muscular tissues may not have time to grow healthfully dense and firm and therefore tough.

Although this has been described as a process of disease, it must still not be considered as a disease that unsuits the animal for food. There is no special poison, of course, as in roup or cholera; the condition is one

detrimental to the fowl, but so might be a bullet through its head.

It will appear from the above considerations that the most profitable fowls for fattening, other things being equal, are those which are in the best condition when you begin. On the whole, these have the best chance of turning the most corn into the most pounds of avoirdupois, and this is another good and sound reason for giving the utmost care to maintaining vigor in your breeding stock. It is needful to remark this, because it is not a part altogether understood by all breeders, who think anything good enough to fatten, although they may be very careful about their laying and their fighting stock.

Fattening must not be begun until the fowl has attained its full growth, before this, in fact, you cannot fatten well, although of course all extra food that will be digested is never lost. The pullets are best taken before they have begun to lay; the male birds when their tails begin to turn, that is when the two sickle feathers begin to top the straight feathers of the tail. The average age will be four months in summer and five to six in winter, but will be early according as the previous feeding has or has not been judiciously generous. Fowls not well fed from the first do not fatten well. Properly fed chicks of the larger breeds come in nicely at four to five months and are of three to four pounds weight; much younger than this, their flesh has not firmness enough to make good eating. Earlier ages than this are however attained by certain crosses, probably because crossing

gives a more vigorous constitution generally. Such a cross for instance as of a Houdan cock with half bred Brahma or Dorking hens has produced chickens fit to market, without need of special fattening, at ten weeks.

The food in fattening forms only part of the things to be considered. The fowls should be kept quiet; all excitement and activity uses up just so much material. To secure this, confine ten or a dozen together in a small pen, taking care to put together such fowls as are accustomed to run in company, as otherwise they will quarrel. The cocks must be removed from the hens. These coops must be kept scrupulously clean, and above all free from vermin. Lousy fowls will not fatten easily. However, the flesh of confined fowls does not have so fine a flavor as those allowed to run. Turkeys must not be cooped or they will get lean.

The quarters should be warm; this is a prime requisite. Not hot, of course, but so warm as to need no assistance from the fat in the body of the animal. They should be kept dark, for at least a part of the time. Some throw a blanket over the coops for an hour or two after every meal. Pitch darkness is not required, only a state that shall produce the greatest amount of quiet. In all these arrangements, however, care must be taken not to prevent proper ventilation; the breeder must endeavor to obtain the greatest amount of health possible under the unnatural circumstances. The place must also be dry. There should be no perches.

In the choice of the particular food to be given, breeders are tolerably well agreed. We must avoid a

great quantity of vegetables, as these given in excess keep the bowels too open, and the same is to be said of green food in general. Table scraps are to be discontinued, also all animal food containing much lean meat; to fat, there is no objection, given in small quantities, except that it is said to deteriorate the fineness and flavor of the flesh. Meat proves too exciting for our present purpose.

All authorities are agreed upon this point, that, in America, at least, corn is the best and cheapest food for the purpose. But even this should not be given constantly and to the exclusion of all other food, variety ought to be sought, keeping in view the leading principle of maintaining digestive vigor as long as possible. Variety, indeed, can begin with the corn itself, which may be used in its different forms, raw, cracked and whole, cooked and uncooked, but the whole grain should be very sparingly used. A mush of warm meal cooked in skimmed milk will give a rich, golden hue to the flesh. The other grains—oats, buckwheat, etc.—may be fed occasionally for a change. In France, buckwheat meal is the article mainly relied on. Barley mixed half and half with corn-meal is useful. Potatoes, which are rich in starchy substances, can be added to the dietary scheme, and are used largely in Liverpool, baked or steamed, given three or four times a day, in fattening fowls, but as they have so little oil, they cannot be as good as a number of other articles. They may be mixed with the meal, and so may, with great advantage, the common yellow carrot.

A good system of feeding recommended for variety is to give on the first day scalded, mashed corn meal with boiled potatoes; on the second, turnips and oat meal; on the third, rice with carrots. Miss Martineau thinks well of stale cakes made with ground oats or beans, brown sugar, milk and mutton suet, crumbled and given morning and evening at the rate of a gill to each fowl. Milk is a good drink now; fowls when fattening become very particular about their drink and will not touch any water but the freshest and purest.

All the varieties of food should be cooked and so far as possible given warm. Salt and cayenne pepper are to be used in moderate quantities, and a good rule is to increase the amount of them a little as the process goes on, and as the digestive organs become accustomed to their use, and begin to flag a little. Charcoal seems to exercise a very favorable influence.

After shutting the fowls up let them fast for several hours, so as to give them a good appetite for their first feed; if this is not done they may continue to mope and feed daintily under their new circumstances. Feed every four hours through the day, beginning early and stopping late, and giving at a time only just what they will eat, so as not to disgust them or take the edge off from their appetites.

Cramming.—Cramming is more practiced in France than elsewhere. It is followed on two systems, solid cramming and liquid cramming. The fowls are shut up separately in coops eight inches wide, so that they cannot turn around. Thus each is alone, but besides this,

the sexes should be kept apart, and only fowls of the same degrees of fatness are kept near each other, so that the new comers shall not disturb the others by their noise. The coops are kept scrupulously clean.

In solid cramming, buckwheat meal, bolted quite fine, is mixed into a stiff dough, and made into rolls about two inches long and the size of the little finger. These are soaked in water or milk, this soaking being essential, and thrust well down into the throat. Two or three rolls are given at a meal, gradually increasing to fifteen; two meals a day, at twelve hours apart, are given with great punctuality.

Fluid cramming is coming more and more into favor in France, and is carried on on a large scale with the aid of a machine, or on a small scale with the use of a funnel, the feed being mixed to a semi-fluid consistence. It is also practiced in this country lately on large poultry farms. The quality of the flesh produced by this method is very superior, and, while will it never be popular in the ordinary family management of poultry on a small scale, it will undoubtedly prevail in those establishments which are (as we predicted in 1871, in our essay entitled "An Egg Farm," would be the case) coming rapidly into existence for the supply of the large metropolitan hotels and markets.

1882.

the
so
air